PETRALOGY, OR THE KNOWLEDGE OF ROCKS AND STONES.

BY HENRY G. MONTAGUE, ESQ., PROFESSOR OF NATURAL PHILOSOPHY.

(*Continued from p.* 381.)

SIDEROUS rocks include all those rocks which contain a portion of iron, which is sufficient to give them peculiar character, with or without reference to the earths with which the iron is united. This, therefore, necessarily includes a vast variety of rocks and stones, such as traps, basalts, iron-stone, jasper, &c.

Jasper, in mineralogy, is a genus of siliceous earth, consisting of a base of silex, iron, magnesia, potash, and other ingredients which distinguish varieties: it is hardish, opaque, breaking into indeterminate fragments, of a conchoidal texture, lightish, somewhat detached, and of every size, from the smallest pebble to that of an entire mountain.

The various acts of formation of jasper furnish an instructive commentary on those teachers of the people who think by one poor solitary term, or by one act of analysis, to lay down the laws of formation and to account for all the varied phenomena of rocks and stones. It is laid down as a rule by philosophers, that it is unwise to multiply causes, and this plea even Sir Isaac Newton puts prominently forth in excuse for many dogmas which time and discovery prove to be erroneous. The love of generalising appears to be almost inherent in humanity, proceeding from a sometimes laudable anxiety to lay down unalterable laws for the guidance and government of others. Educated in this way, the truth is taken for granted, and few men think of seeking further, or to raise a doubt where firm belief is impressed upon the mind. Thus one man's discovery becomes the light of others, until doubts arise from the accidents of observation, and then men find that the light by which they have been hitherto guided is not clear or strong enough to reflect on the new objects contemplated.

Jasper is a siliceous body, and as such presents almost innumerable varieties, passing into or altered to agate, cornelian, opal, green-stone, porphyry, and other definable bodies. It presents itself under several varieties as an organic product in its mineralized state. In the Nubian and Egyptian desert it is exceedingly abundant, enormous fossilized beds of shell-fish and of vertebrated fishes and the relics of oceanic animals being wholly composed of this mineral. Its mode of formation is variable; on the surface of extensive valleys, it would appear, that on the rapid evaporation of the waters, shoals of fish had been left behind, and preserved from entire decomposition by the salt and marine acid in which they were disposed, they gradually silicified as the liquid matters evaporated. They are sometimes found in the shrivelled state, such as must take place by long incineration in saline waters; at other times their outer configuration is so beautifully preserved, that we are enabled to identify the species to which they belong, and of these I observed between thirty and forty species now common to the Red Sea. The shell-fish are still more true to nature; they retain not only the exactitude of form as when in the living state, but they also present the whole internal configuration of the stomach, the shield appearance of the shell, the stomach, and other appendages, and the cryptogamia which were attached to them in the living state. This is the direct state of change, embracing not only vast quantities of mollusca and swimming fishes, but also branches of coral, of such extent as often to be mistaken for fossilised wood.

In the indirect state of change, they first decompose into the state of carbonate of lime, or chalk, and this, on exposure, gradually hardens, silicifies, and passes into the same material. On the other hand, towards the eastern portions of the Red Sea, balani build vast edifices in groups and families, almost wholly independent of the myriads of living creatures surrounding them; and being of a hardy nature, they are found in the living state at high-water mark. Here the building ceases, and when (as near the coast was formerly the case), they are wholly abstracted from the waters, they pass through the like changes and present the same appearance as Egyptian jasper, the small pebble being a true sample of the jasper rock. The hills bordering Upper Egypt are sometimes wholly composed of these families, some of them having passed into the state of chalk, others partly or wholly silicified, presenting on the surface the honey-combed appearance produced by the sudden cessation of vital action and consequent disappearance of that animal matter which was exposed to the influence of the atmosphere. These are true animalized rocks, seen in every stage of change, from the living concrete mass to the perfect jasper rock, presenting its smooth brown surface to the sun, and sometimes rising full 150 feet above the level of the plain.

Other phenomena illustrate the ways of nature still more admirably. While travelling in Upper India, I found groups of the very same formation rising above the level of the surrounding plain, their honey-combed shape being similar to the formations on the banks of the Nile; but here they had passed into a species of siderate or iron-stone. Again, I have observed this peculiar rock in other climes, presenting a glossy surface, beautiful colour, and gem-like appearance.

Egyptian jasper contains at most but very minute portions of alumina, and these are the results of accidental intrusion where they are found. Its formation takes place precisely like that of nephrite or jade, but the latter is very often the silicified remains of large ocean fish, which being thrown into lagoons, where living creatures, from the nature of the saline waters, cannot live, they either enter into the bituminous state, or otherwise they silicify and are converted into nephrite, so valued by the Chinese, and so common to some of the islands of the South Sea and Pacific. I recollect, previous to travelling, having read in Captain Cook's voyages of a similar account of the origin of jade being given, the natives informing him that if fish were placed in the neighbouring lake they would soon be converted into it.

Why should it be doubted that the living that the great fountain of life, as it continually flows over, adds to the strength and permanent increase of the fossil and mineral kingdoms? Look at your own country: the flints within the chalk, the wood among the coal; the very stones on which you daily tread, the very cup you drink from—do they not all of them tell this same true but curious tale of other times? The fish, once basking in the sunshine of life, is chalk, is a siliceous pebble, is bitumen, is iron-stone, is a component part of rock. Whatever may be its state, its usefulness is preserved, and it may be made to administer to the happiness of man, as it sometimes administers to his vanity in the form of a siliceous gem, decking the bosom of some fair one, emblem of her purity of heart, and reflecting the shadows of her smiles.

Striped or ribbon jasper is distinguished by having differently coloured alternate parallel layers, without lustre, internally of an imperfect conchoidal texture. It is found in Siberia, in Saxony, near Gnartstein, and Woltitz, and particularly fine at Ural, in large amorphous masses, forming long layers; its colour is yellowish, greenish grey, ochraceous, isabella yellow, brownish red, pale or dark flesh red, or dark green. It takes a high polish. The finest Siberian ribbon jasper is found, together with other varieties, in the hills that border on the southern part of the Uralian mountains, about 100 or 150 leagues northward of the Caspian Sea, in the neighbourhood of the fortress of Orskara. It is found in large masses, and wrought into cameos, and other ornaments. In the Bombay Presidency, at a short distance from Poonah, there are several large beds of green earth, which is the mother earth to the ribbon jasper and blood-stone; it is of the consistence and character of the clay, and, like clay, hardens on exposure to the atmosphere; and small pieces, exposed to long continuous atmospheric action, are seen in every stage of silicification, until, in its ripened beauties, it appears as blood-stone. The formations in those Ghauts have some analogy to the jasper mountains of Siberia; and when we consider the fossil phenomena of Siberia, demonstrative evidence is abundantly manifest, that the jasper of the latter place was formed under an analogous latitude. This green earth, in its soft and silicified state, is very abundantly diffused throughout Africa; and the Orientals, and even people of this country, have always held the stone in great estimation, ascribing certain sovereign virtues to it, such as stopping hemorrhage, &c. It possesses a dull surface an earthy fracture, previous to its silicifying but is then susceptible of a very high polish.

The origin of jasper is more obscured in the writings of the day than any other siliceous compound. In its natural state, and preserving the rounded form of the body to which it owes its origin, geologists, imbued with the notions passing current, suppose that it must be classed with rolled pebbles, and that its local accumulations have been occasioned by the action of sea beaches: thus one error begets another, for one-half of the so termed rolled beaches of this country have originated in a similar manner, of which many of the hornstones and all the flints are demonstrable evidence. Some suppose that the petrified echini, which appear like small stone cannon balls, having a nucleus separated from the surrounding coatings by a coating of crystallized quartz, are precisely the same as the balls in hornstone, which is the case, and both have an origin similar to the agate nodules found in amygdaloidal rock. These stones are termed geodes by the modern geologists, who assume that they have been formed by the gradual accretion of matter around a nucleus or kernal. Corder observed brecciated rock containing vast quantities of these Egyptian pebbles. Breccia of this formation is, in fact, very common in the Nubian desert.

Nephrite is found in many parts of America, particularly near the great river Amazon, and was formerly held in high esteem by the natives for some supposed medical virtues; it abounds in some parts of Upper India, and in many other countries.

THE NATURE OF DESIGN.

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BY MR. CRACE, V.P., MEMBER OF THE INSTITUTE OF FINE ARTS.

(*Continued from p.* 362.)

EGYPT was contemporaneous with the Assyrian empire, which made way for the Babylonian, Median, Persian, Macedonian and Roman. In discovering and tracing the invention, cultivation, and improvement of the arts and sciences, their origin and progress, we perceive the nearer we approach those countries once inhabited by the sons of Noah, the more perfect is the knowledge of those arts; so that in after times, when men desired to revive the forgotten arts they found advantage in going back to their original source. The people of Asia were of a warlike cast, varying according to the nature of the country they inhabited; thus the arts of manufacture would be early applied to offensive weapons and armour. Their steel was of excellent temper and variety of form. They had helmets and cuirasses of brass, which, it is recorded, fitted so well the body as not to intercept motion and agility of limb. Greaves covered the thighs and legs of the horsemen; their brazen shields, of great length, were very celebrated, and their horses were usually armed, the faces, cheeks, and flanks being covered in brass. Now we read that this armour was distinguished for its elaborate workmanship, its richness and costliness; *design* must therefore have largely entered into its original construction and subsequent embellishment. Their chariots, body and wheels, were elegant, and of great strength; the pole, axletrees, &c., armed with scythes. In later ages, luxury and extravagance rose to excess: it became the custom for the court and wealthy men to make the most profuse display of magnificence and pompous splendour, calculated to dazzle the eyes of a people. In war they went to the field accompanied by their wives and concubines, each in proportion to his ability. The equipage of such a troop must have been immense, and the most exquisite dainties were to be procured wherever this host might be encamped. They had their jewels, and vessels of gold or silver; their garments were richly shining with gold,—the dresses of the women, of the nobles, and of the king, were equally numerous and magnificent. A people thus disposed to luxurious enjoyment would naturally seek to enrich and embellish with the refinement of art every manufacture that could promise the creation of new ideas or new pleasures. *Design* would be lavished upon

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